another pup, or when meeting its master. The badger seemed equally well pleased. This playing and fondling of each other was kept up for over half an hour, and until they disappeared around the end of a butte near by. Again, during the month of March, when camped near the intersection of the Bridger road with the overland trail, a still more curious example of this companionship occurred. At early dawn I observed a coyote close to a pile of specimens, about 200 yards from my tent. The following night I placed some meat on this pile and the coyote "went for it," about the same time in the morning. I repeated this experiment, as my object was to observe more closely its habits, and especially to ascertain how tame it might be made by decent treatment. To my surprise, on the fourth morning the coyote was accompanied by a badger. The following morning the coyote came alone, but on the morning after that the badger again came along. After that neither coyote nor badger made their appearance, but why they abandoned my hospitable quarters is a mystery to me. In these instances the coyote carried off the breakfast that I had provided, and I could not tell whether or not it was shared with the badger. It, however, became evident to me that these animals do not associate by accident; they must have some affinity for each other, or else they would not thus come together.

The coyote is naturally sociable. Often when I have encountered him amid the wilds of nature he stood and gazed after me wistfully, as if he meant to say, "I wish I could have your company." He soon learns to know that man is his enemy, and for his own preservation gives him a wide berth.

It is not at all improbable that future investigation may show this fellowship to be a case of symbiosis. It is hoped that this will call out others who have had more extended opportunities to observe the habits of these animals. One of the first from whom I learned of this intimacy between the coyote and badger was W. U .Hoftile, of Lander, Wyoming Territory.—*Samuel Aughey.*

ANTHROPOLOGY.[1]

THE ASTOR LIBRARY.—The thirty-fifth annual report of the Astor library, for 1883, affords some information upon the popularity of anthropological studies. In the department of science and art there were 76,573 volumes called for; of these, 105 were upon anthropology; 783 upon archæology; 119 upon ethnology; 666 upon mythology, and 1020 upon social science. In the common acceptation, however, social science means more than it does in the anthropological sense. The latter includes only those works in which the rigid methods of natural history are applied to society. The former includes every speculation on the natural ills that flesh is heir to. In the department of history and literature the number of volumes called for was 89,824. Of these, 184

[1] Edited by Professor OTIS T. MASON, 1305 Q street, N. W., Washington, D. C.

were upon chronology; 4559 upon heraldry and genealogy; 214 upon the history of American Indians; 739 upon oriental literature; 863 upon manners and customs; 717 upon Orientalia; 4404 upon philology and linguistics. Doubtless many other volumes were drawn for anthropological research, for instance, those on war, biology, domestic economy, ethics, geography, history, travels, etc.

THE BRITISH ASSOCIATION ANTHROPOMETRIC COMMITTEE.—In 1875 the British Association appointed a committee on anthropometry, of which Dr. William Far was chairman until 1878. The reports of the committee are as follows: 1878, 5 p., Annual Rep. 182–6; 1879, 35 p., *ibid.* 175–209; 1880, 41 p., *ibid.* 120–159; 1881, 48 p., *ibid.* 225–272; 1882, 3 p., *ibid.* 278–280; 1883, final report, 54 p., separate. The points to which inquiries were addressed are: 1. Stature; 2. Weight; 3. Chest-girth; 4. Color of eyes; 5. Color of hair; 6. Breathing capacity; 7. Strength of arm; 8. Sight; 9. Span of arms; 10. Size and shape of head; 11. Lower limbs; 12. Measures of other parts of the body. These measures were applied to the different elements of the mixed population of Great Britain and compared with those of other parts of the world. The results are partly shown in the following table:

Race or Nationality.			*Authority.*	*Meters.*	*Ft. In.*
Polynesian	Samoa	1 853	La Perouse, Garnot, Beechey, Porter, Cook, &c., Various, Wilkes, Novara, Lesson, Rollin	1.762	5 9.33
	Tahiti & Pitcairn	1.782			
	Marquesas	1.763			
	New Zealand	1.755			
	Polynesians	1.753			
	Sandwich	1.731			
English professional class			Anthrop. Com.	1.757	5 9.14
Patagonians		1.778	Musters	1.754	5 9.00
		1.730	D'Orbigny		
Angamis (Naga hills)			Woodthorp	1.754	5 9.00
Negroes (Congo)			Topinard	1.752	5 8.95
Scotch			Anthrop. Com.	1.746	5 8.71
Amakosa Kaffirs			Sir A. Smith	1.741	5 8.50
Iroquois Indians			Gould	1.735	5 8.28
Todas (Nilghiries)			Marshall	1.727	5 7.95
Negroes (Calabar)			Topinard	1.727	5 7.95
N. A. Indians			Baxter	1.726	5 7.93
Irish			Anthrop. Com.	1.725	5 7.90
U. S. Whites			Baxter	1.719	5 7.67
English			Anthrop. Com.	1.719	5 7.66
Norwegians		1.727	Beddoe	1.719	5 7.66
"	immigrants U. S.	1.717	Baxter		
Zulus			Roberts	1.707	5 7.19
English laborers			Anthrop. Com.	1.705	5 7.08
Canadians, U. S., French immigrants			Baxter	1.703	5 7.01
Tajiks of Feyhana & Samarkand			Ujfalvy	1.705	5 7.10
Swedes, U. S., immigrants			Baxter, Beddoe	1.700	5 6.90
Chippeway Indians			Oliver	1.700	5 6.90
Kabyles			Topinard	1.699	5 6.85
Welsh			Anthrop. Com.	1.695	5 6.66
Danes, U. S., immigrants			Baxter	1.694	5 6.65
Dutch, " "			Baxter	1.693	5 6.62
American Negroes			Baxter	1.693	5 6.62

Race or Nationality.	*Authority.*	*Meters.*	*Ft. In.*
English, U. S., immigrants	Baxter	1.692	5 6.58
Hungarians	Baxter	1.692	5 6.58
English Jews	Anthrop. Com.	1.692	5 6.57
Germans, U. S., immigrants	Baxter	1.691	5 6.54
Swiss of Geneva	Dunant	1.688	5 6.43
Swiss, U. S., immigrants	Baxter	1.687	5 6.38
Russians, " "	Baxter	1.687	5 6.38
Belgians	Quetelet	1.687	5 6.38
French, U. S., immigrants	Baxter	1.683	5 6.23
Poles " "	Baxter	1.682	5 6.20
French upper classes	De Quatrefages	1.681	5 6.14
Germans	Novara	1.680	5 6.10
Mexicans	Baxter	1.680	5 6.10
Berbers of Algeria	Topinard	1.680	5 6.10
Arabs	Various	1.679	5 6.08
Usbeks of Ferghana & Samarkand	Ujfalvy	1.679	5 6.08
Javanese	Novara	1.679	5 6.08
Persians	Shulz	1.678	5 6.04
Italians, U. S., immigrants	Baxter	1 677	5 6.00
South American "	Baxter	1.675	5 5.90
Australians (aborig.)	Various	1.669	5 5.68
Austrian Sclaves	Novara	1.669	5 5.68
Galchas, Iranian mountaineers	Ujfalvy	1.668	5 5.66
Spaniards, U. S., immigrants	Baxter	1.668	5 5.66
Berbers of Algeria	Topinard	1.666	5 5.62
Portuguese, U. S., immigrants	Baxter	1.663	5 5.43
Ainos	Rosky	1.660	5 5.33
Austrian Germans	Novara	1.658	5 5.27
French working classes	De Quatrefages	1.657	5 5.24
Eskimo, N. A.	Various	1.654	5 5.10
Hungarian (military statistics)	Scheiber & Beddoe	1.652	5 5.04
Caucasians	Shortt	1.650	5 4.93
New Guinea	Various	1.646	5 4.78
Hindoos	Shortt	1.645	5 4.76
Bavarians	Novara	1.643	5 4.68
Ruthenians	Majer & Kopernicki	1.640	5 4.54
Dravidians	Shortt	1.639	5 4.50
Cingalese	Davy	1.638	5 4.48
Austrian Roumanians	Novara	1.631	5 4.37
Chinese	Novara	1.630	5 4.17
Italian conscripts (1.620)	An. di Statist. 1879	1.626	5 4.00
Fuegians	Novara	1.625	5 3.98
Polish Jews	Mayer & Kopernicki	1.623	5 3.88
Poles	" "	1.622	5 3.87
Finns (Beddoe, 5 ft. 5.81)	Novara	1.617	5 3.60
Papuans	Various	1.606	5 3.20
Japanese	Mrs. Ayrton	1.604	5 3.11
Aymaras, Peru	Forbes	1.601	5 3.00
Peruvians	D'Orbigny	1.600	5 3.00
Cochin Chinese	Finlayson	1.593	5 2.70
Malays	Raffles, Crawfurd, &c.	1.583	5 2.34
Veddas of Ceylon	Bailey	1.536	5 0.42
Lapps	Horch	1.500	4 11.2
Andamanese	Man	1.492	4 10.7
Aëtas	De Quatrefages	1.482	4 10.3
Semangs	De Quatrefages	1.448	4 9.0
Mincopese	De Quatrefages	1.436	4 8.53
Bosjesman	Various	1.341	4 4.78
Differences between the tallest and the shortest		.421	1 4.55
Average stature of man		1.658	5 5.25

ANTHROPOLOGY AT THE NATIONAL CAPITAL.—The city of Washington is becoming such an important center of anthropological material and research, that students in other places are likely to become confused in seeking for any special information. To prevent embarrassment it is well to bear in mind the following facts:

1. In the Smithsonian building proper is the Department of Antiquities, in charge of Dr. Charles Rau. Here are deposited all relics recovered from mounds, graves, ancient structures, caves, shell-heaps, etc., situated in our own country; all relics of antiquity from abroad; and the artefacts of stone, bone, shell, ivory, etc., found in the United States and known to be the handiwork of the aborigines. Many other typical objects of culture are also on exhibition in Anthropological hall. Archæologists visiting the capital will naturally make this collection the central point of their investigations. A more minute description of Dr. Rau's work will be given in a subsequent number of the NATURALIST.

2. Under its present organization the National Museum has a Department of Arts and Industries, of which Professor G. Brown Goode is curator. One section of this department embraces savage and barbarous industries, and to this we now direct especial attention. No professional ethnologist is in charge, but Mr. J. K. Goodrich is engaged in arranging the material, and Ensign Albert P. Niblack. U.S.N., has been detailed to study here. This branch of the museum has, for a nucleus, the Wilkes collection, and it includes all the specimens formerly combined with Dr. Rau's department, but not representative of the stone age. From all parts of the world objects have come to enrich this ethnologic treasury, and it would be impossible to mention even the names of the contributors. The Centennial Exhibition at Philadelphia was the means of greatly enhancing the store. During the past year most valuable additions have been made to this part of the National Museum.

Mr. C. L. McKay, signal officer, recently drowned in the Alaskan seas, sent over a hundred specimens of the hunting and fishing apparatus used by the natives of Bristol bay.

Mr. J. J. McLain, signal officer, gathered a typical set of textile work and a number of pipes from the vicinity of Sitka.

Mr. W. J. Fisher, in the same service, donated over 150 specimens of dance ornaments, weapons and household utensils from the same region.

Mr. Stejneger, signal officer, made fine collections on Bering isles, Commander group.

The National Museum has succeeded in effecting an exchange with the Leipzig museum, founded originally in Dresden by Dr. Gustav Klemm, by which a large number of tools and weapons from the west coast of Africa have come into possession.

Lieutenant Ray gathered at Point Barrow an illustrative series of Eskimo objects.

Collections of musical instruments have been contributed from Tiflis, and by Mr. J. H. Foot, of New York.

The Bureau of Ethnology has just turned over to the museum its entire store of pottery, ceremonial apparatus, foods, textile fabrics, arms and implements from the Zunis and the Moquis. This gift includes many thousands of specimens.

The most interesting addition made to the museum by any of its special agents last year, was that secured by Mr. J. G. Swan, of Washington Territory. It consists of miscellaneous objects gathered along the north-west coast from Sitka to Puget sound, together with exhaustive types from the Haidahs and the Makahs. From the former come the beautiful objects in carved slate. Besides the miniature totem posts, with their allegorical figures and a great variety of dishes and pipes, there are square covered boxes, richly ornamented, that would hold five or six gallons. The Makah material, gathered with special reference to the London fishery exhibition, includes every kind of object that enters into this industry among this tribe.

3. The Bureau of Ethnology is under the direction of Major J. W. Powell. Its function is to study the anthropology of the North American aborigines, living and extinct. The work of the several parts of this bureau will be more fully described in the future.

All of the institutions just described are more or less officially connected with the Smithsonian Institution, under the direction of Professor Spencer F. Baird. The first named has for its medium of publication the Smithsonian Contributions to Knowledge, Miscellaneous Collections, and Annual Report; the second makes known its operations through the Proceedings of the National Museum; and the Bureau of Ethnology publishes its Annual Report, and Contributions to North American Ethnology.

4. The Army Medical Museum, under the official direction of Dr. Robert Murray, Surgeon-General, U. S. A., and in charge of Dr. John S. Billings, is devoted to anthropology in its more restricted sense. Here are deposited crania, skeletons, preparations of soft parts, microscopic sections, etc., relating to the human body. It is here also that the great Index-Catalogue is made up and Index Medicus is edited.

5. The Anthropological Society of Washington, numbering now one hundred and fifty members, holds its meetings at the Army Medical Museum, on the first and the third Tuesday in each month. The society has published two volumes of Transactions and is in a flourishing condition. Major J. W. Powell is president for 1884, and Colonel F. A. Seely, U. S. Patent Office, is secretary, to whom all communications should be addressed.

There are many departments of the Government where anthropological material is gathered and where excellent contributions

are made to this science. Indeed, there is not a single department of anthropology that is not well represented in Washington. The Patent Office, the Census Bureau, the Board of Health, the Department of Agriculture, the Signal Office, the Indian Office are only a few of these. Further reference to some of these institutions and their operations will be made in future numbers of the NATURALIST.

MICROSCOPY AND HISTOLOGY.[1]

METHODS OF INVESTIGATING ANIMAL CELLS.—Dr. Brass has devoted several years of close study to the structure and life of animal cells, and a detailed account of his methods appears in the first number of a new journal of microscopy.[2] The following are some of the more important of these methods:

1. *Protozoa.*—As most Protozoa move very rapidly when hungry, it is well to feed them before attempting to study them with the microscope. If well fed with powdered pieces of plants, &c., they usually remain quiet after a short time, and begin to assimilate the food-material which they have appropriated. In this condition of comparative quiet they can be easily examined with high powers. For this purpose they may be placed under a cover-glass with considerable water and a number of small green algæ to keep the water supplied with oxygen.

For higher powers Abbe's illuminating apparatus is extremely useful. In some cases it is desirable to have a completely one-sided illumination, and this is best effected by inserting beneath the illuminating apparatus a circular diaphragm-plate perforated with a slit 3^{mm} wide that runs parallel to the edge of the plate. It is best to have about 2^{mm} between the slit and the edge of the plate. Several diaphragm plates should be prepared in which the slit varies in extent from a half to a whole of a quadrant or more.

The following mixture, which is Meckel's fluid with the addition of a little acetic acid, is recommended above all other reagents as a preservative medium:

Chromic acid	1 part.
Platinum-chloride	1 "
Acetic acid	1 "
Water	400–1000 "

Unicellular animals die very slowly in this mixture, and suffer very much less alteration in structure than when killed in osmic acid or picro-sulphuric acid.

A special method is required for Protozoa filled with opaque food-material. In many cases the nucleus and the structure of the cell-body are completely obscured by foreign bodies. The method adopted in such cases is as follows:

(1) Placed in picro-sulphuric acid 3–4 minutes.

[1] Edited by Dr. C. O. WHITMAN, Mus. Comp. Zool., Cambridge, Mass.

[2] *Zeitschr. für wiss. Mikroskopie*, I, No. 1, pp. 39–51, 1884.